Silica sol composition, membrane electrode assembly with proton-exchange membrane, and fuel cell

Publication number: EP1463140 **Publication date:** 2004-09-29

Inventor:

ONO MICHIO (JP); WARIISHI KOJI (JP); NOMURA

KIMIATSU (JP); KIKUCHI WATARU (JP)

Applicant:

FUJI PHOTO FILM CO LTD (JP)

Classification:

- international: C08G77/28; C07F7/08; C08G77/00; C08G77/48;

C08J5/22: H01B1/06: H01B1/12: H01M2/02: H01M8/02; H01M8/10; C07F7/00; C08G77/00; C08J5/20; H01B1/06; H01B1/12; H01M2/02;

H01M8/02; H01M8/10; (IPC1-7): H01M8/10; C07F7/08;

C08G77/00; C08J5/22; H01B1/12

- European:

C08J5/22B2D; C08G77/04; H01B1/12F

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JP20030432663 20031226

Also published as:



US2004241522 (A1) JP2004307814 (A) EP1463140 (A8)

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Abstract of EP1463140

Provided are a proton-exchange membrane of which the ionic conductivity is high and the methanol crossover is low, and a fuel cell of high power that comprises the proton-exchange membrane. The proton-exchange membrane has a structure of mesogen-containing organic molecular chains and a proton-donating group-containing group covalent-bonding to a silicon-oxygen three-dimensional crosslinked matrix, in which at least a part of the organic molecular chains are oriented to form an aggregate thereof; and the fuel cell comprises the membrane.

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Inventor Name Search Result

Your Search was:

Last Name = ONO First Name = MICHIO

Application#	Patent#	Status	Date Filed	Title	Inventor Name
09252009	6556531	=	02/16/1999	MULTI-LAYERED HOLOGRAPHIC READ-ONLY MEMORY AND DATA RETRIEVAL METHOD	ONO, MICHIO
09516628	6495067	150	03/01/2000	LIQUID CRYSTAL COMPOUND, LIQUID CRYSTAL MIXTURE OR COMPOSITION, ELECTROLYTE COMPRISING THE SAME, ELECTROCHEMICAL CELL AND PHOTO- ELECTROCHEMICAL CELL CONTAINING THE ELECTROLYTE	ONO, MICHIO
09631385	6376765	150	08/03/2000	ELECTROLYTE COMPOSITION, PHOTOELECTRIC CONVERSION DEVICE AND PHOTO-ELECTROCHEMICAL CELL	ONO, MICHIO
09759363	6727023	150	01/16/2001	ELECTROLYTE COMPOSITION, ELECTROCHEMICAL CELL AND IONIC LIQUID CRYSTAL MONOMER	ONO, MICHIO
09765368	6750352	150	01/22/2001	POLYMERIZABLE MOLTEN SALT MONOMER, ELECTROLYTE COMPOSITION AND ELECTROCHEMICAL CELL	ONO, MICHIO
09933716	6627099	150	08/22/2001	ELECTROLYTE COMPOSITION AND ELECTROCHEMICAL BATTERY USING THE SAME	ONO, MICHIO
09963419	6740807	150	09/27/2001	LIGHT-RECEIVING DEVICE AND IMAGE SENSOR	ONO, MICHIO
10374075	Not	161	02/27/2003	Electrolytic composition and non-	ONO, MICHIO

		Issued	•	I ii	aqueous electrolytic secondary battery	
	10374906	6811728	150		MULTI-LAYERED HOLOGRAPHIC READ-ONLY MEMORY AND DATA RETRIEVAL METHOD	ONO, MICHIO
	10620168	6964997	150	07/15/2003	MOLDED ARTICLE FOR INTERIOR PARTS OF A CAR	ONO, MICHIO
	10672190	Not Issued	71	09/26/2003	Organic-inorganic hybrid material, organic-inorganic hybrid proton-conductive material and fuel cell	ONO, MICHIO
	10806258	Not Issued	41	03/22/2004	Organic-inorganic hybrid proton- conductive membrane, and fuel cell	ONO, MICHIO
4	10807689	Not Issued	71	03/24/2004	Silica sol composition, membrane electrode assembly with proton-exchange membrane, and fuel cell	ONO, MICHIO
	10956337	Not Issued	89	10/04/2004	Process for producing corrugated plate and device for producing corrugated plate	ONO, MICHIO
	10956467	Not Issued	41	09/30/2004	Multi-layered holographic read- only memory and data retrieval method	ONO, MICHIO
	10968532	Not Issued	61	10/19/2004	Method for producing ion exchanger, ion exchanger, membrane electrode assembly, and fuel cell	ONO, MICHIO
	10969530	Not Issued	30	10/20/2004	Compound, and solid electrolyte, proton conductor, membrane electrode assembly and fuel cell comprising the compound	ONO, MICHIO
	11448995	Not Issued	25	06/07/2006	Air outlet device for vehicle cabin	ONO, MICHIO
	06061432	4289102	150	07/27/1979	ENGINE SPARK TIMING CONTROLLING DEVICE	ONODA, MICHIO
	06138572	4337640	150	04/08/1980	KNOCKING SENSOR	ONODA, MICHIO
	06166946	4364259	150	07/08/1980	VIBRATION SENSOR FOR AN AUTOMOTIVE VEHICLE ENGINE	ONODA, MICHIO
	06173811	4393837	150	07/30/1980	SPARK TIMING CONTROL SYSTEM FOR AN INTERNAL COMBUSTION ENGINE	ONODA, MICHIO
	06215720	4385598	250	12/12/1980	ENGINE SYSTEM	ONODA, MICHIO

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Inventor Name Search Result

Your Search was:

Last Name = ONO First Name = MICHIO

					75
Application#	Patent#				Inventor Name
06451229	4430423	150		COLOR PHOTOGRAPHIC	ONO, MICHIO
				LIGHT-SENSITIVE MATERIAL	
06478727	Not	166	03/25/1983	RESIN-MOLDED	ONO, MICHIO
	Issued			SEMICOND UCTOR DEVICE	
06539781	4984059	150	10/07/1983	SEMICONDUCTOR DEVICE	ONO, MICHIO
				AND A METHOD FOR	
				FABRICATING THE SAME	
06579714	Not	166	02/13/1984	HIGH PACKING DENSITY	ONO, MICHIO
	Issued			LEAD FRAME AND	
	·		·	INTEGRATED CIRCUIT	
06595195	4587210	250	03/30/1984	COLOR PHOTOGRAPHIC	ONO, MICHIO
				SILVER HALIDE LIGHT-	
				SENSITIVE MATERIAL	
				CONSISTING OF A SPECIFIED HYDROQUINGNE DERIVATIV	
r				ITT DROQUINGIVE BERTYATIV	
06599358	Not	161	04/12/1084	SILVER HALIDE COLOR	ONO, MICHIO
00399338	Issued	101	04/12/1984	PHOTOGRAPHIC LIGHT-	Orto, where
	133404			SENSITIVE MATERIALS	
06696610	4564586	150	01/30/1985	SILVER HALIDE COLOR	ONO, MICHIO
00070010	130 1300	130	01/30/1303	PHOTOGRAPHIC LIGHT-	
				SENSITIVE MATERIAL	
06748537	Not	166	06/25/1985	SILVER HALIDE COLOR	ONO, MICHIO
32:	Issued			PHOTOGRAPHIC LIGHT-	
				SENSITIVE MATERIALS	
06760852	4686177	150	07/31/1985	SILVER HALIDE COLOR	ONO, MICHIO
				PHOTOGRAPHIC LIGHT-	
				SENSITIVE MATERIALS	
06833535	4698660	150	02/12/1986	RESIN-MOLDED	ONO, MICHIO
				SEMICONDUCTOR DEVICE	
06890962	Not	166	07/29/1986	HIGH PACKING DENSITY	ONO, MICHIO
	Issued			LEAD FRAME AND	
				INTEGRATED CIRCUIT	
		1			

06894149	4724280	150		PACKAGE FOR INTEGRATED CIRCUIT	ONO, MICHIO
06912095	Not Issued	166	09/29/1986	RESIN-MOLDED SEMICONDUCTOR DEVICE	ONO, MICHIO
07009065	Not Issued	166	01/27/1987	SILVER HALIDE COLOR PHOTOGRAPHIC LIGHT- SENSITIVE MATERIALS CONTAINING CYAN DYE FORMING COUPLER	ONO, MICHIO
07044270	4746602	150	04/30/1987	SILVER HALIDE COLOR PHOTOGRAPHIC MATERIAL	ONO, MICHIO
07136518	4892810	150	12/22/1987	SILVER HALIDE COLOR PHOTOGRAPHIC LIGHT- SENSITIVE MATERIAL CONTAINING CYAN DYE FORMING COUPLER	ONO, MICHIO
07185301	4801997	150	III I	HIGH PACKING DENSITY LEAD FRAME AND INTEGRATED CIRCUIT	ONO, MICHIO
07207929	4903114	250	06/15/1988	RESIN-MOLDED SEMICONDUCTOR	ONO, MICHIO
07216573	4904575	150	07/08/1988	SILVER HALIDE COLOR PHOTOGRAPHIC MATERIAL WITH HETEROCYLIC FUSED PHENOL COUPLER	ONO, MICHIO
07218789	4983493	150	07/14/1988	DYES FOR HEAT SENSITIVE TRANSFER RECORDING	ONO, MICHIO
07324560	Not Issued	161	03/16/1989	CYAN DYE-FORMING COUPLER AND SILVER HALIDE PHOTOSENSITIVE MATERIAL CONTAINING THE SAME	ONO, MICHIO
07382447	5026634	150		COLOR LIGHT-SENSITIVE MATERIAL	ONO, MICHIO
07383525	4992801	150	07/24/1989	GLASS ANTENNA DEVICE FOR AN AUTOMOBILE	ONO, MICHIO
07427381	5024924	150	10/27/1989	METHOD FOR PROCESSING SILVER HALIDE COLOR PHOTOGRAPHIC MATERIALS	ONO, MICHIO
07434673	5160780	150		STRUCTURE FOR INSTALLING MIRROR BASE ON GLASS PLATE AND METHOD FOR INSTALLING MIRROR BASE ON GLASS PLATE	
07489637	5032487	150	03/07/1990	COLOR LIGHT SENSITIVE	ONO, MICHIO

ľ				MATERIAL	
07584651	Not Issued	166	09/19/1990	SILVER HALIDE COLOR PHOTOGRAPHIC LIGHT- SENSITIVE MATERIAL CONTAINING A CYAN DYE- FORMING COUPLER	ONO, MICHIO
07648894	5210012	150	01/31/1991	SILVER HALIDE COLOR PHOTOGRAPHIC MATERIAL	ONO, MICHIO
07833799	5190852	150	02/12/1992	SILVER HALIDE PHOTOGRAPHIC MATERIAL	ONO, MICHIO
07874682	Not Issued	166	04/28/1992	METHOD FOR INSTALLING MIRROR BASE ON GLASS PLATE	ONO, MICHIO
07884897	5260177	250	05/18/1992	SILVER HALIDE COLOR PHOTOGRAPHIC LIGHT- SENSITIVE MATERIAL	ONO, MICHIO
07889417	5464693	150	05/28/1992	STRUCTURE FOR INSTALLING MIRROR BASE ON GLASS PLATE AND METHOD FOR INSTALLING MIRROR BASE ON GLASS PLATE	ONO, MICHIO
<u>07918612</u>	5236803	150	07/27/1992	COLOR LIGHT-SENSITIVE MATERIAL WITH HYDROQUINONE REDUCING AGENT	ONO, MICHIO
08001613	RE35109	150	01/07/1993	SEMICONDUCTOR DEVICE AND METHOD FOR FABRICATING THE SAME	ONO, MICHIO
08227381	5543279	150	11	SILVER HALIDE LIGHT- SENSITIVE MATERIAL	ONO, MICHIO
08227382	Not Issued	166	11	HEAT DEVELOPABLE COLOR LIGHT-SENSITIVE MATERIAL	ONO, MICHIO
08384462	Not Issued	161	02/02/1995	STRUCTURE FOR INSTALLING MIRROR BASE ON GLASS PLATE AND METHOD FOR INSTALLING MIRROR BASE ON GLASS PLATE	ONO, MICHIO
08439253	5585231	150	05/11/1995	HEAT DEVELOPABLE COLOR LIGHT-SENSITIVE MATERIAL WITH PYRAZOLOTRIAZOLE CONTAINING DYE	ONO, MICHIO
08544935	5622810	150	10/18/1995	SILVER HALIDE COLOR PHOTOSENSITIVE MATERIAL	ONO, MICHIO
08551141	Not Issued	161	10/31/1995	BORON-CONTAINING COMPOUND, ITS POLYMER,	ONO, MICHIO

					T.
				CATALYST COMPRISING THE POLYMER AND METALLOCENE COMPOUND, AND PROCESS FOR PRODUCING POLYOLEFIN	
08590323	5736299	150		SILVER HALIDE COLOR PHOTOGRAPHIC MATERIAL COMPRISING A MAGENTA OR CYAN COUPLER AND A HYDRAZINE COMPOUND	ONO, MICHIO
08603091	Not Issued	166		HEAT DEVELOPABLE COLOR LIGHT-SENSITIVE MATERIAL	ONO, MICHIO
08695636	5750755	150		SILVER HALIDE COLOR PHOTOSENSITIVE MATERIAL	ONO, MICHIO
08733719	6127088	150		HEAT DEVELOPABLE COLOR LIGHT-SENSITIVE MATERIAL	ONO, MICHIO
08736205	5736293	150	10/25/1996	IMAGE FORMING METHOD	ONO, MICHIO
08776777	5869723	150	02/10/1997	IONIC COMPOUND AND OLEFIN POLYMERIZATION CATALYST CONTAINING THE SAME	ONO, MICHIO
08879759	Not Issued	161	06/20/1997	OPTICAL MATERIALS	ONO, MICHIO
08932827	Not Issued	161		SILVER HALIDE COLOR PHOTOSENSITIVE MATERIAL	ONO, MICHIO
08981545	6121182	150	12/11/1997	POLYOLEFIN PRODUCTION CATALYST AND METHOD OF PREPARING POLYOLEFINS	ONO, MICHIO
 09203759	6048637	150	12/02/1998	NONAQUEOUS SECONDARY BATTERY	ONO, MICHIO

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Inventor Name Search Result

Your Search was:

Last Name = WARIISHI

First Name = KOJI

Application#	Patent#	Status	Date Filed	Title	Inventor Name
08124586	5342744	150		SILVER HALIDE PHOTOGRAPHIC MATERIAL	WARIISHI, KOJI
08216285	5459265	150	03/23/1994	SILVER HALIDE PHOTOGRAPHIC LIGHT- SENSITIVE MATERIAL	WARIISHI, KOJI
08378403	5543529	150	01/26/1995	1-CARBAMOYL-5- HYDOXYPYRAZOLE COMPOUNDS AND SALTS THEREOF	WARIISHI, KOJI
08379209	5556985	150	01/27/1995	PYRAZOLONOXONOL COMPOUNDS	WARIISHI, KOJI
08513184	5665528	150	08/09/1995	SILVER HALIDE PHOTOGRAPHIC MATERIAL CONTAINING DYE	WARIISHI, KOJI
08524462	5609999	150	09/07/1995	SILVER HALIDE COLOR PHOTOGRAPHIC MATERIAL	WARIISHI, KOJI
08532880	5714307	150	09/22/1995	SILVER HALIDE PHOTOGRAPHIC MATERIAL CONTAINING INFRARED ABSORBING COLORANT	WARIISHI, KOJI
08734953	5728832	150	10/23/1996	PHTHALIDE COMPOUND AND RECORDING MATERIAL USING THE SAME	WARIISHI, KOJI
08896954	5879772	150		INFORMATION RECORDING MEDIUM	WARIISHI, KOJI
08941310	6670475	150	09/30/1997	INFORMATION RECORDING MEDIUM	WARIISHI, KOJI
08947197	6020105	150		INFORMATION RECORDING MEDIUM	WARIISHI, KOJI
08980304	5853969	150		SILVER HALIDE PHOTOGRAPHIC MATERIAL CONTAINING INFRARED ABSORBING COLORANT	WARIISHI, KOJI

09026610	5998094	150		OPTICAL INFORMATION RECORDING MEDIUM	WARIISHI, KOJI
09203759	6048637	150	12/02/1998	NONAQUEOUS SECONDARY BATTERY	WARIISHI, KOJI
09231970	6203876	150		INFORMATION RECORDING MEDIUM	WARIISHI, KOJI
09313185	Not Issued	161	05/18/1999	INFORMATION RECORDING MEDIUM AND OXONOL COMPOUND	WARIISHI, KOJI
09343275	6406817	150		CROSSLINKED POLYMER, ELECTROLYTE USING THE POLYMER, AND NONAQUEOUS SECONDARY BATTERY USING THE ELECTROLYTE	WARIISHI, KOJI
09391511	Not Issued	161	09/08/1999	CROSSLINKED POLYMER, ELECTROLYTE, AND PHOTO- ELECTROCHEMICAL CELL CONTAINING THE ELECTROLYTE	WARIISHI, KOJI
09631385	6376765	150	08/03/2000	ELECTROLYTE COMPOSITION, PHOTOELECTRIC CONVERSION DEVICE AND PHOTO-ELECTROCHEMICAL CELL	WARIISHI, KOJI
09933716	6627099	150	08/22/2001	ELECTROLYTE COMPOSITION AND ELECTROCHEMICAL BATTERY USING THE SAME	WARIISHI, KOJI
10024187	6841299	150	12/21/2001	ELECTROLYTE COMPOSITION AND NON-AQUEOUS ELECTROLYTE SECONDARY CELL	WARIISHI, KOJI
10080067	6902850	150	02/22/2002	ELECTROLYTE COMPOSITION, METHOD FOR PRODUCING THE SAME AND NON-AQUEOUS ELECTROLYTE SECONDARY CELL	WARIISHI, KOJI
10374075	Not Issued	161	02/27/2003	Electrolytic composition and non- aqueous electrolytic secondary battery	WARIISHI, KOJI
10431506	Not Issued	41	05/08/2003	Crosslinked polymer, electrolyte, and photo-electrochemical cell containing the electrolyte	WARIISHI, KOJI
10455723	Not	161	06/06/2003	Information recording medium and	WARIISHI, KOJI

·	Issued		1	oxonocompound	·
10724232	6849316	150	12/01/2003	INFORMATION RECORDING MEDIUM	WARIISHI, KOJI
10806258	Not Issued	41	03/22/2004	Organic-inorganic hybrid proton- conductive membrane, and fuel cell	WARIISHI, KOJI
10807689	Not Issued	71	03/24/2004	Silica sol composition, membrane electrode assembly with proton-exchange membrane, and fuel cell	WARIISHI, KOJI
10968532	Not Issued	61	10/19/2004	Method for producing ion exchanger, ion exchanger, membrane electrode assembly, and fuel cell	WARIISHI, KOJI
10969530	Not Issued	30	10/20/2004	Compound, and solid electrolyte, proton conductor, membrane electrode assembly and fuel cell comprising the compound	WARIISHI, KOJI
11019177	Not Issued	83	12/23/2004	Information recording medium and oxonol compound	WARIISHI, KOJI
11090993	Not Issued	30	03/26/2005	Compound, and solid electrolyte, proton conductor, membrane electrode assembly and fuel cell comprising the compound	WARIISHI, KOJI
11138352	Not Issued	30	05/27/2005	Silicon-containing compound, composition containing said compound, and insulating material	WARIISHI, KOJI
11218297	Not Issued	30	09/01/2005	Proton-conductive material and method for production thereof, membrane electrode assembly, and fuel cell	WARIISHI, KOJI
11502389	Not Issued	25	08/11/2006	Insulating film-forming composition, insulating film and production method thereof	WARIISHI, KOJI
11515014	Not Issued	30	09/05/2006	Composition, film and producing method therefor	WARIISHI, KOJI
11515818	Not Issued	30	09/06/2006	Film forming composition, insulating film and production process of the insulating film	WARIISHI, KOJI
11522892	Not Issued	30		Insulating-film forming composition, insulating film and preparation process thereof	WARIISHI, KOJI
11757438	Not Issued	25	06/04/2007	IMAGE RECORDING MATERIAL, PLANOGRAPHIC PRINTING PLATE	WARIISHI, KOJI

				PRECURSOR, AND PLANOGRAPHIC PRINTING METHOD USING THE SAME	
11889228	Not Issued	20	08/10/2007	Image recording material	WARIISHI, KOJI

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Inventor Name Search Result

Your Search was:

Last Name = NOMURA First Name = KIMIATSU

Application#	Potent#	Status	Data Filed	Title	Inventor Name
08753886	5683850				NOMURA, KIMIATSU
08859716	5866293	150	05/21/1997		NOMURA, KIMIATSU
09023200	5925489	150	02/13/1998		NOMURA, KIMIATSU
09145345	6017672	150		HEAT-SENSITIVE RECORDING MATERIAL	NOMURA, KIMIATSU
09328489	6245476	150		PHOTO-SENSITIVE AND HEAT-SENSITIVE RECORDING MATERIAL	NOMURA, KIMIATSU
09441957	6329116	150	11/17/1999	PYRROLO[1,2-A]PYRIMIDINE COMPOUND AND HEAT- SENSITIVE RECORDING MATERIAL USING THE SAME	NOMURA, KIMIATSU
09684963	6316605	150	10/10/2000	Hydrazone dye	NOMURA, KIMIATSU
10132292	6703345	150	04/26/2002	DIAZONIUM SALT AND HEAT-SENSITIVE RECORDING MATERIAL	NOMURA, KIMIATSU
10636816	7022823	150		DIAZONIUM SALT, ITS SYNTHESIZING METHOD AND RECORDING MATERIAL	NOMURA, KIMIATSU
10653242	7118844	150			NOMURA, KIMIATSU
10807689	Not Issued	71		Silica sol composition, membrane electrode assembly with proton-	NOMURA, KIMIATSU

				exchange membrane, and fuel cell	
10968532	Not Issued	61	10/19/2004	Method for producing ion exchanger, ion exchanger, membrane electrode assembly, and fuel cell	NOMURA, KIMIATSU
10969530	Not Issued	30	÷	Compound, and solid electrolyte, proton conductor, membrane electrode assembly and fuel cell comprising the compound	NOMURA, KIMIATSU
11433286	Not Issued	41		3 /	NOMURA, KIMIATSU
11689799	Not Issued	25		Catalyst Material For Use In Fuel Cell, Catalyst Membrane, Membrane Electrode Assembly and Fuel Cell	NOMURA, KIMIATSU
11766810	Not Issued	16		Solid Electrolyte, Membrane and Electrode Assembly, and Fuel Cell	NOMURA, KIMIATSU

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Inventor Name Search Result

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Last Name = KIKUCHI First Name = WATARU

Application#	Patent#	Status	Date Filed	Title	Inventor Name
08530426	5651912			DECORATIVE MOLD FOR FORMING CONCRETE SURFACE WITH UNEVEN PATTERN	KIKUCHI, WATARU
08587489	5754526	150		CHANNEL SWITCHING METHOD AND CHANNEL SWITCHING CONTROLLER	KIKUCHI, WATARU
08755366	5687125	250	11/25/1996	SEMICONDUCTOR MEMORY DEVICE HAVING REDUNDANCY MEMORY CELLS INCORPORATED INTO SUB MEMORY CELL BLOCKS	KIKUCHI, WATARU
09807372	6698249	150		POROUS GLASS BASE MATERIAL PRODUCTION DEVICE AND METHOD	KIKUCHI, WATARU
10787127	Not Issued	161	02/27/2004	Stacked semiconductor package	KIKUCHI, WATARU
10807689	Not Issued	71	03/24/2004	Silica sol composition, membrane electrode assembly with proton-exchange membrane, and fuel cell	KIKUCHI, WATARU
10973961	Not Issued	25		Memory system and memory module	KIKUCHI, WATARU
11218297	Not Issued	30	09/01/2005	Proton-conductive material and method for production thereof, membrane electrode assembly, and fuel cell	KIKUCHI, WATARU
11348232	Not Issued	30	02/07/2006	Solid electrolyte, method for producing solid electrolyte, membrane and electrode assembly, and fuel cell	KIKUCHI, WATARU
11531167	Not	30	09/12/2006	STACKED SEMICONDUCTOR	KIKUCHI,

·	Issued		PACKAGE	WATARU
11692360	Not Issued	30	Polymer Electrolyte, Membrane/Electrode Assembly, and Fuel Cell	KIKUCHI, WATARU

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